

The Development of Integrated STEM-PBL Physics Module for Learning Classical Mechanics in Secondary Education

ABSTRACT

Integrated STEM-PBL physics module is an alternative instructional strategy developed for students to learn classical mechanics in secondary education. A theoretical framework developed based on the learning theories of situated learning, social constructivism, and cognitive constructivism to be used as guidelines in designing the processes and procedures in the module. Prior to the development of integrated STEM-PBL physics module, needs analysis was conducted in the form of interviews on three physics teachers and fifteen Form 4 students in Malaysia to analyze the root of problems for learning physics in secondary education. The findings from the needs analysis became the foundation to develop the module by following the steps in the ADDIE model. PBL model was employed to determine how the content in the module was designed and arranged to be aligned with the learning objectives. Integrated STEM-PBL physics module was evaluated through interviews, expert judgment and pilot study. Seven experts validated the module. The results showed the module had excellent face validity and content validity. This study may provide guidelines for teachers on how to implement integrated STEM-PBL approach especially in teaching classical mechanics and promote STEM competencies among students in secondary education.